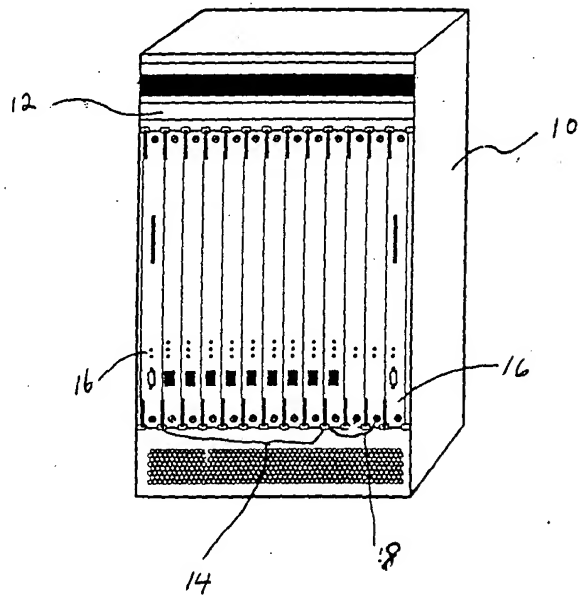


Figure 1

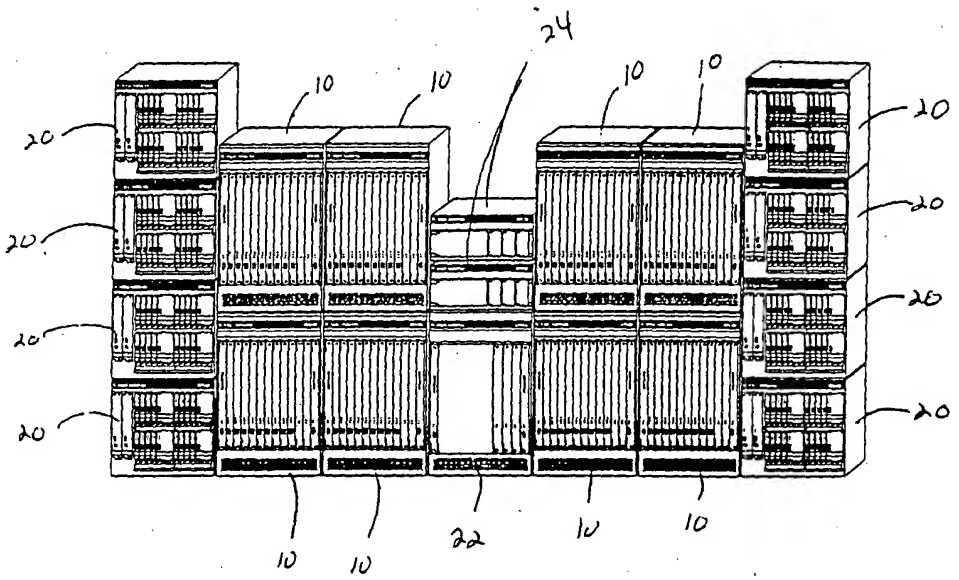


Figure 2

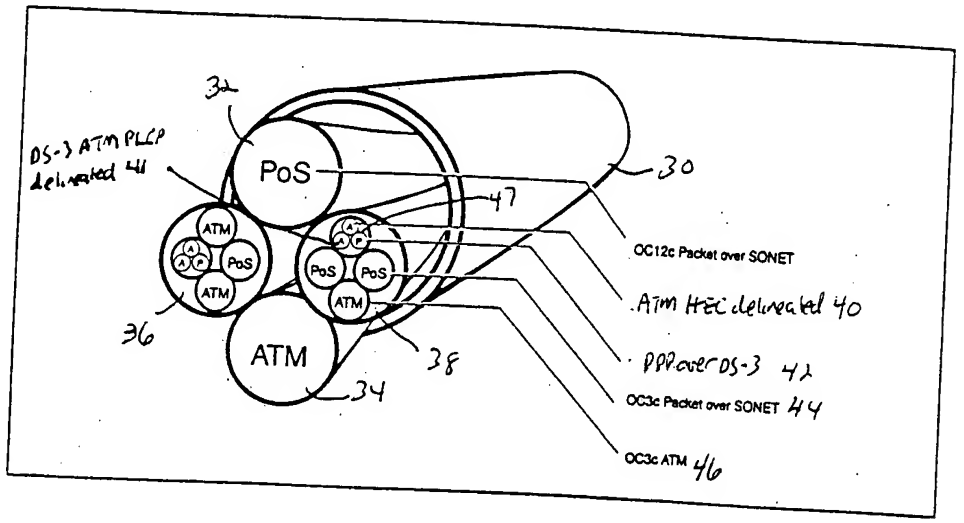

32
DS-3 ATM PLCP delineated 41
PoS
30
47
OC12c Packet over SONET
ATM HEC delineated 40
PPP over DS-3 42
OC3c Packet over SONET 44
OC3c ATM 46
ATM
PoS
ATM
36
ATM
38
34

Figure 3

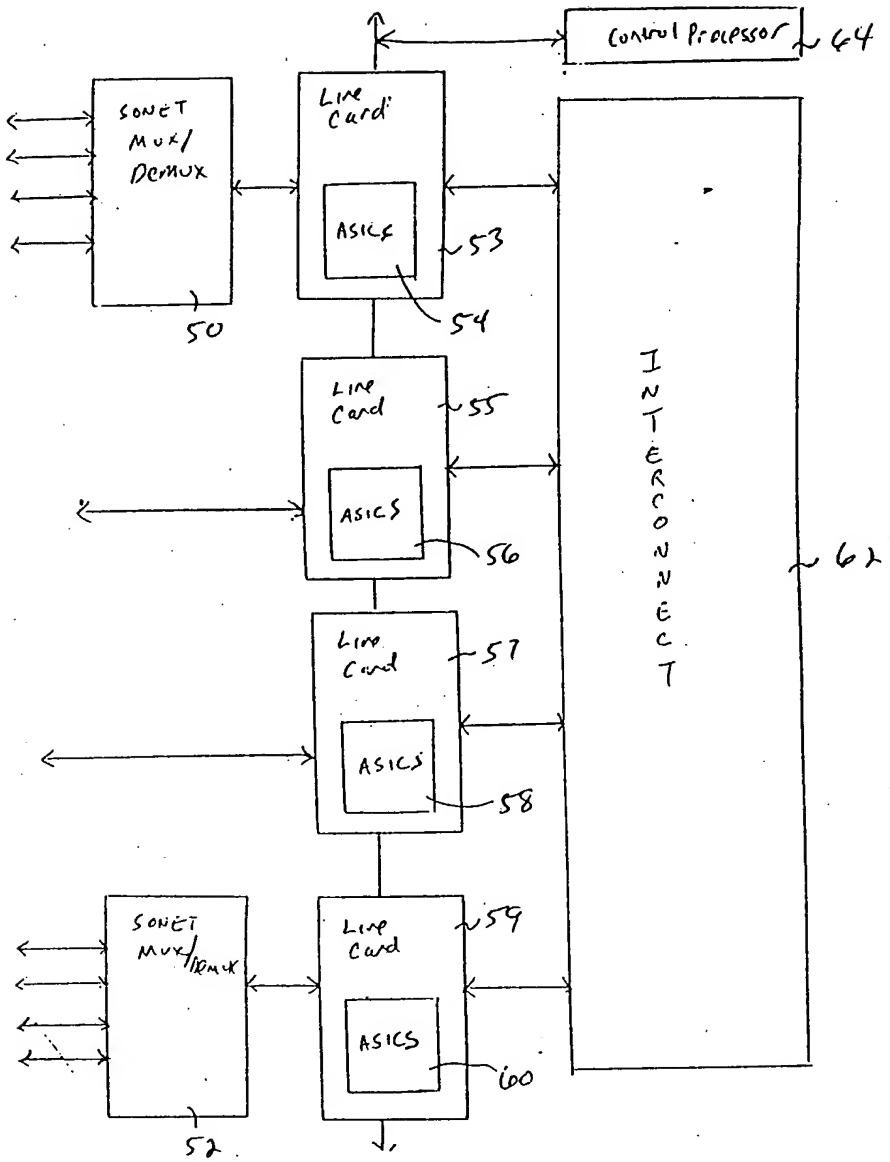

Control Processor
64
SONET MUX/ DeMUX
50
Line Card
ASICs
53
54
Line Card
55
ASICs
56
Line Card
57
ASICs
58
SONET MUX/DeMUX
52
Line Card
59
ASICs
60
INTERCONNECT
62

Figure 4

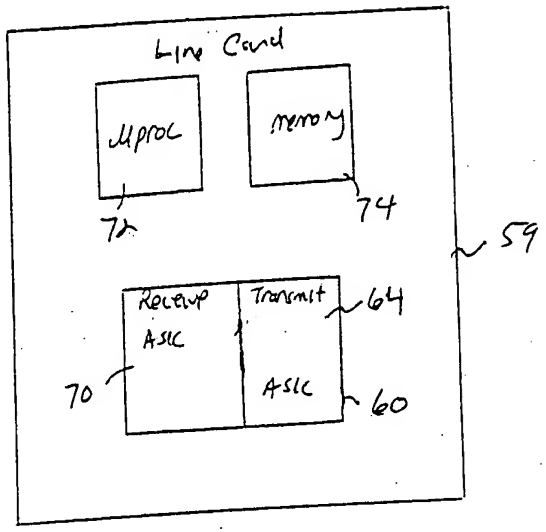

Line Card
Uproc
Memory
72
74
59
Receive
ASIC
Transmit
64
70
ASIC
60

Figure 5

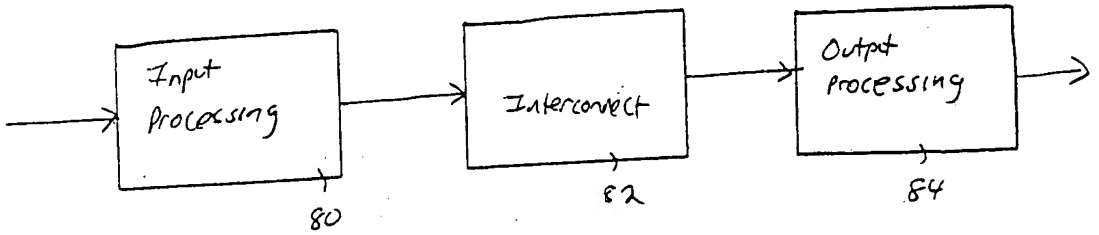


Figure 6

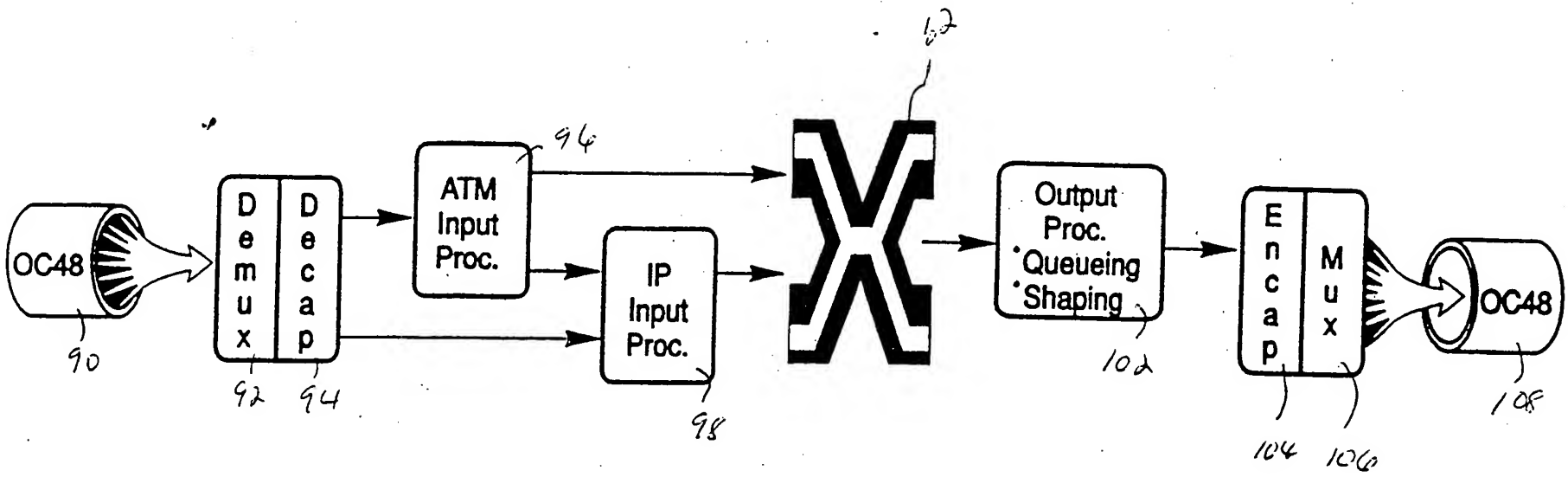

OC48
90
Demux
Decap
92
94
ATM Input Proc.
96
IP Input Proc.
98
62
Output Proc.
•Queueing
•Shaping
102
Encap
Mux
104
106
OC48
108

Figure 7

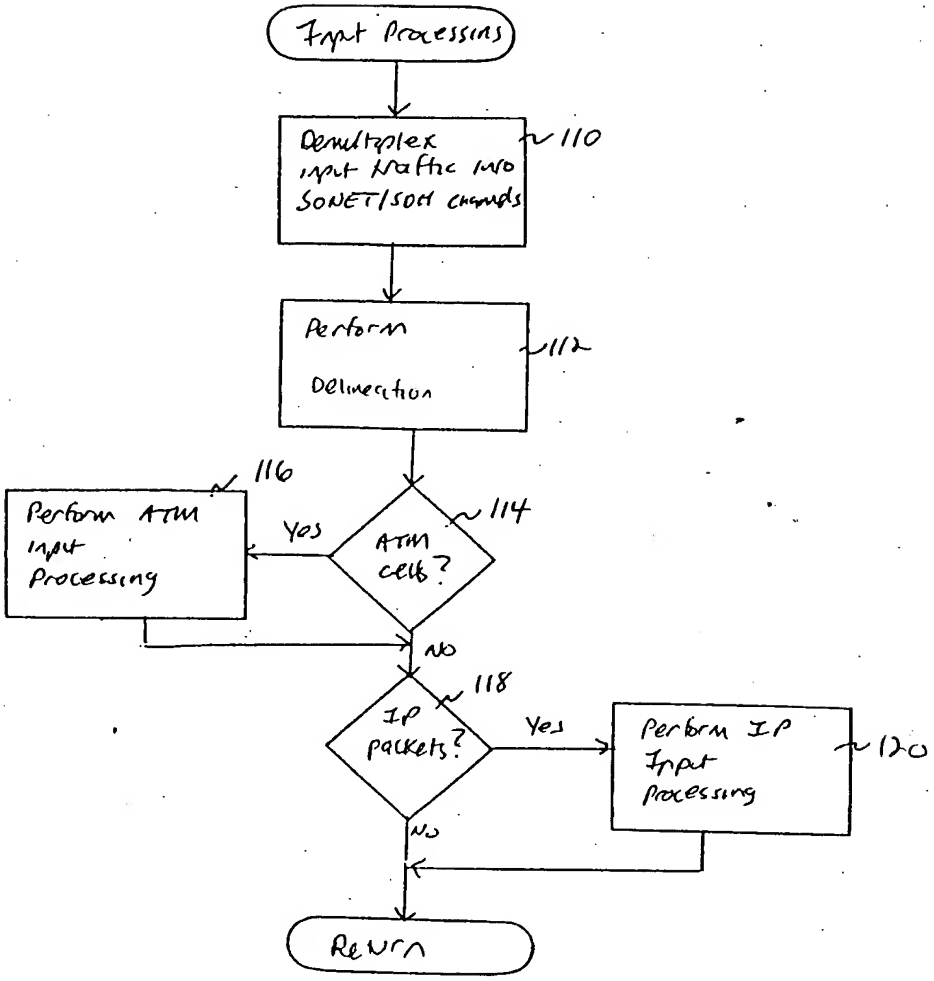

Input Processing
Demultiplex input traffic into SONET/SDH channels
110
Perform Delineation
112
Perform ATM input Processing
116
Yes
ATM cells?
114
No
IP packets?
118
Yes
Perform IP Input Processing
120
No
Return

Figure 8

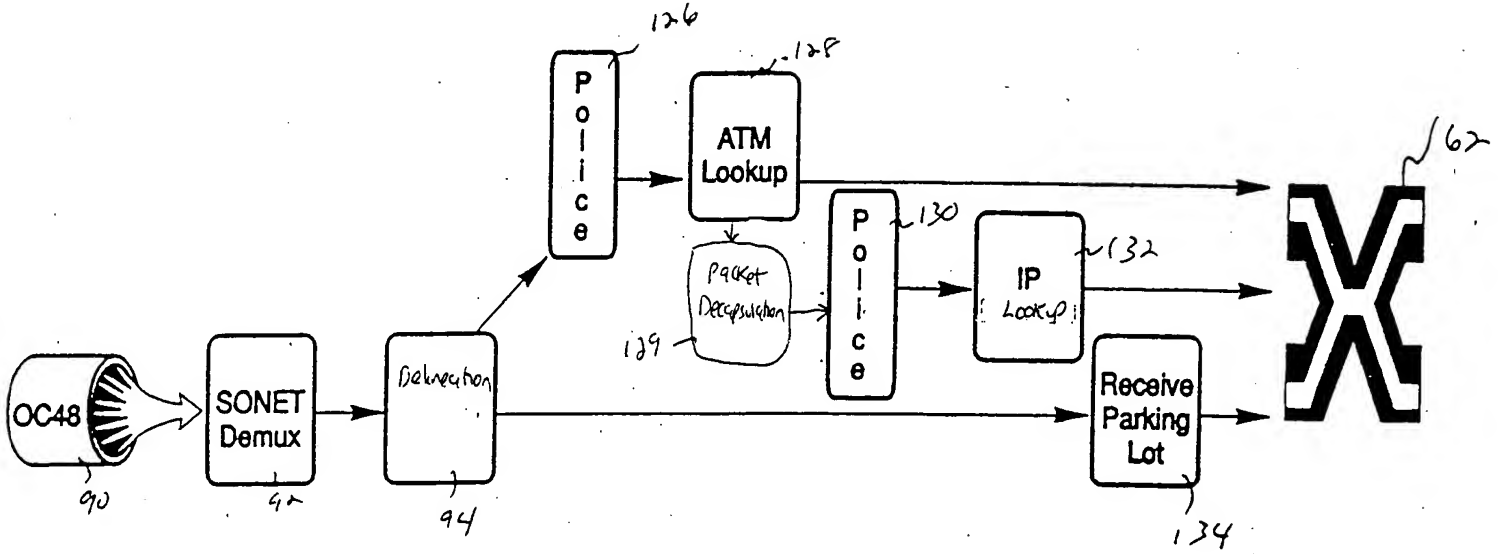

OC48
SONET Demux
Detection
Police
ATM Lookup
Packet Decapsulation
Police
IP Lookup
Receive Parking Lot
90
92
94
126
128
129
130
132
134
62

Figure 9

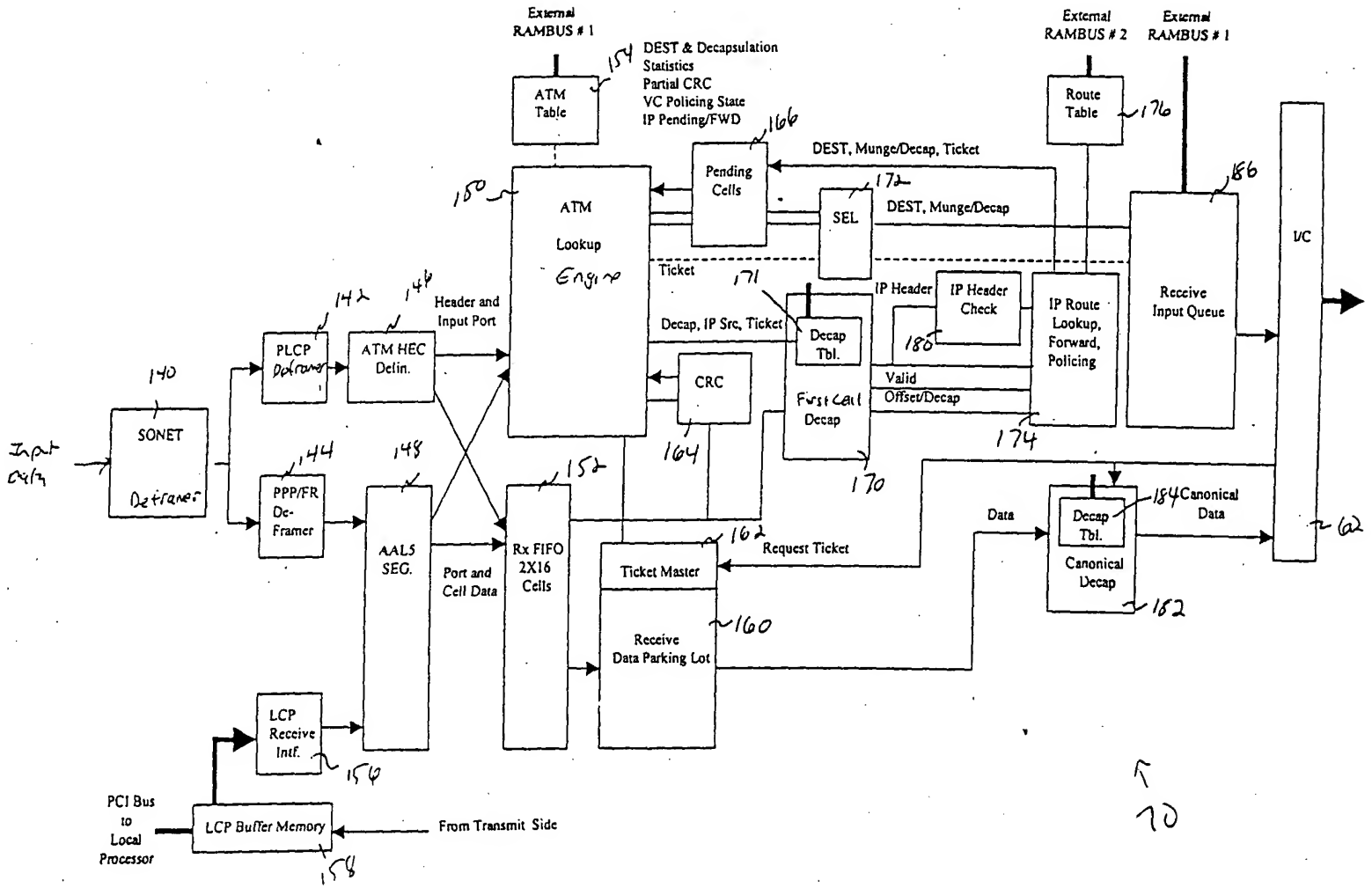

External RAMBUS # 1
154
DEST & Decapsulation Statistics Partial CRC VC Policing State IP Pending/FWD
ATM Table
166
Pending Cells
DEST, Munge/Decap, Ticket
External RAMBUS # 2
External RAMBUS # 1
Route Table
176
186
VC
150
ATM Lookup Engine
172
SEL
DEST, Munge/Decap
Ticket
171
IP Header
IP Header Check
Receive Input Queue
142
146
Header and Input Port
Decap, IP Src, Ticket
Decap Tbl.
180
IP Route Lookup, Forward, Policing
PLCP Deframer
ATM HEC Delin.
CRC
Valid
Offset/Decap
First Cell Decap
140
164
174
Input Cells
SONET Deframer
144
148
152
170
PPP/FR De-Framer
AAL5 SEG.
Rx FIFO 2X16 Cells
Ticket Master
162
Request Ticket
Data
184
Canonical Data
Decap Tbl.
Canonical Decap
182
Port and Cell Data
160
Receive Data Parking Lot
LCP Receive Intf.
156
PCI Bus to Local Processor
LCP Buffer Memory
From Transmit Side
158

Figure 10

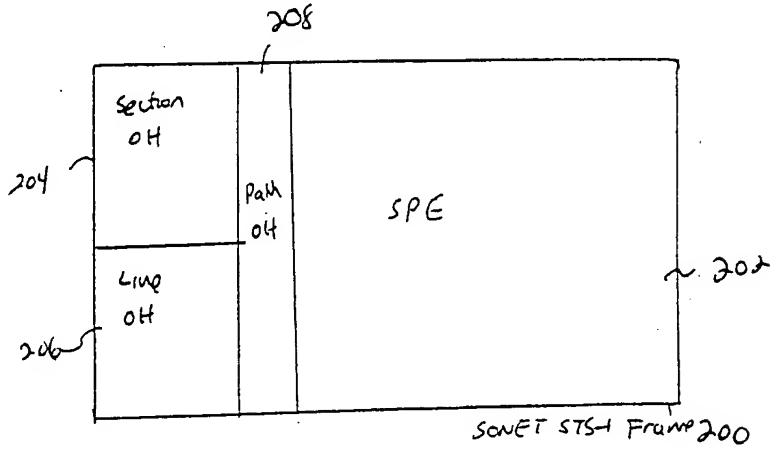

208
Section OH
204
Path OH
SPE
Line OH
206
202
SONET STS-1 Frame 200

Figure 11

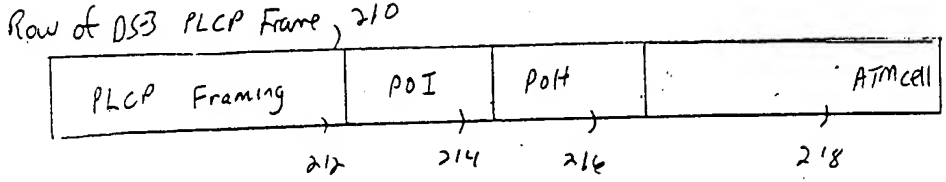

Row of DS3 PLCP Frame, 210
PLCP Framing
POI
POH
ATM cell
212
214
216
218

Figure 12

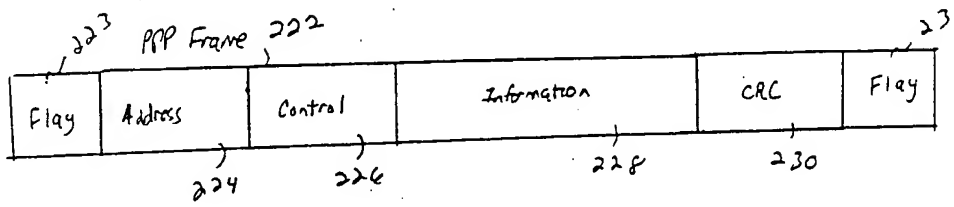

223
PPP Frame 222
231
Flag
Address
Control
Information
CRC
Flag
224
226
228
230

Figure 13

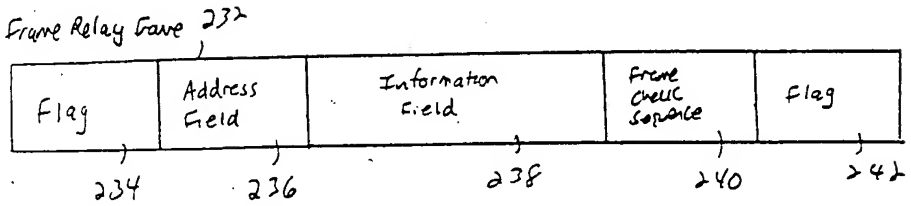

Frame Relay Frame 232
Flag
Address Field
Information Field
Frame Check Sequence
Flag
234
236
238
240
242

Figure 14

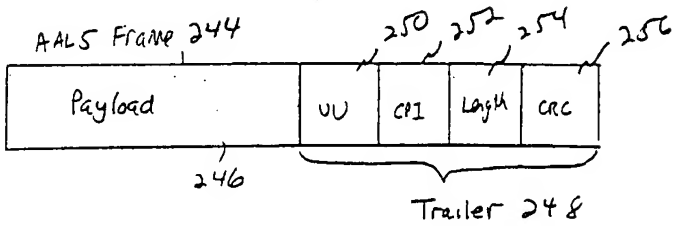

AAL5 Frame 244
250
252
254
256
Payload
UU
CPI
Length
CRC
246
Trailer 248

Figure 15

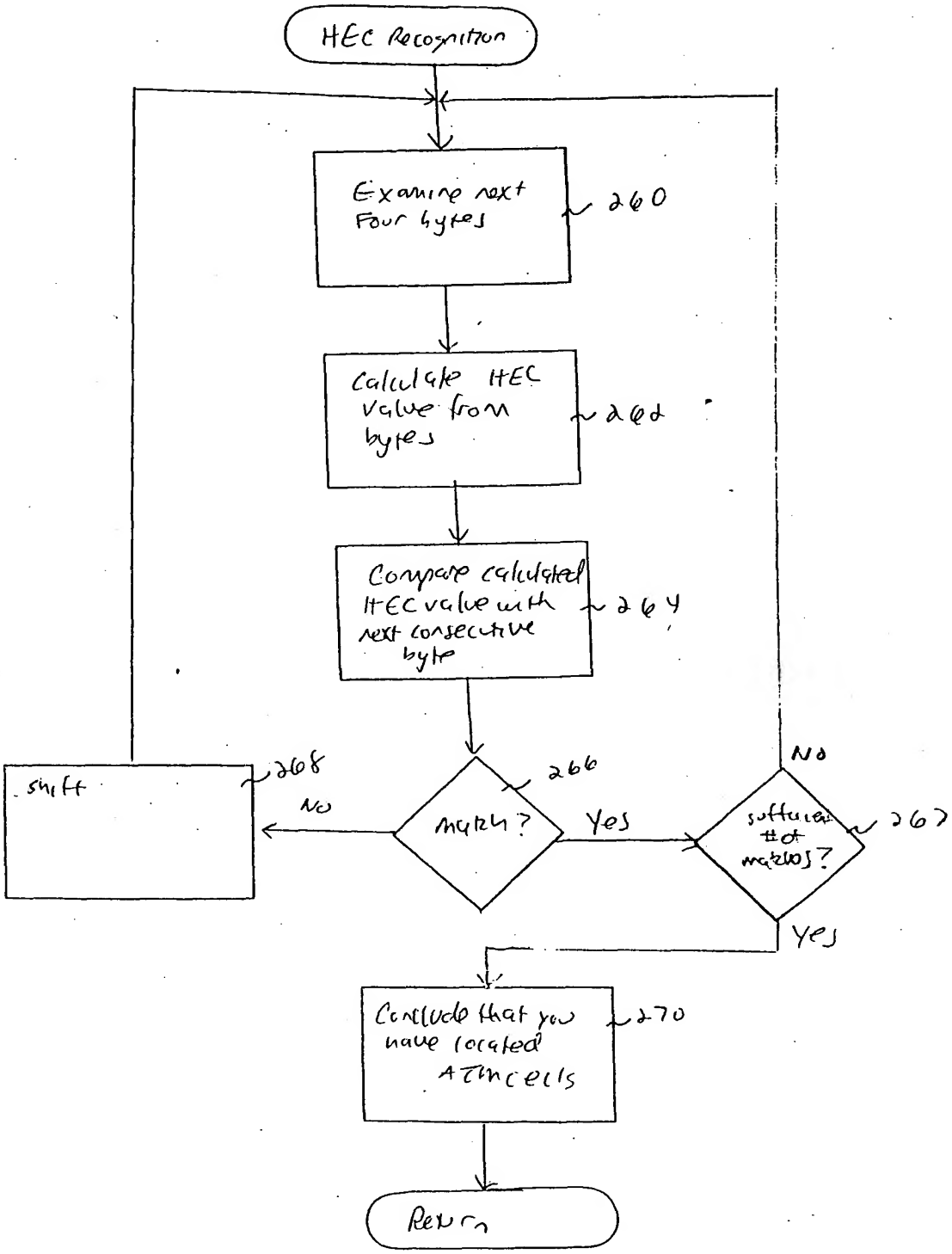

HEC Recognition
Examine next Four bytes
260
Calculate HEC value from bytes
262
Compare calculated HEC value with next consecutive byte
264
266
match?
No
Yes
268
shift
No
sufficient # of matches?
267
Yes
Conclude that you have located ATM cells
270
Return

Figure 16

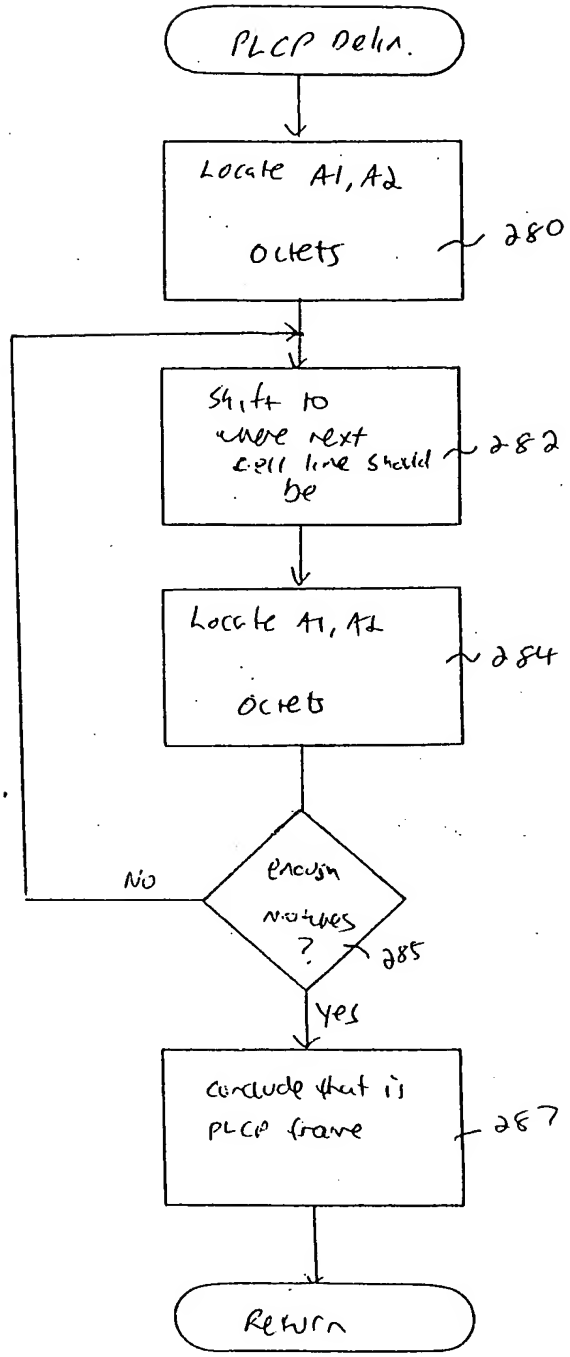

PLCP Delin.
Locate A1, A2 octets
280
Shift to where next cell line should be
282
Locate A1, A2 octets
284
Enough matches ?
285
No
Yes
Conclude that is PLCP frame
287
Return

Figure 17

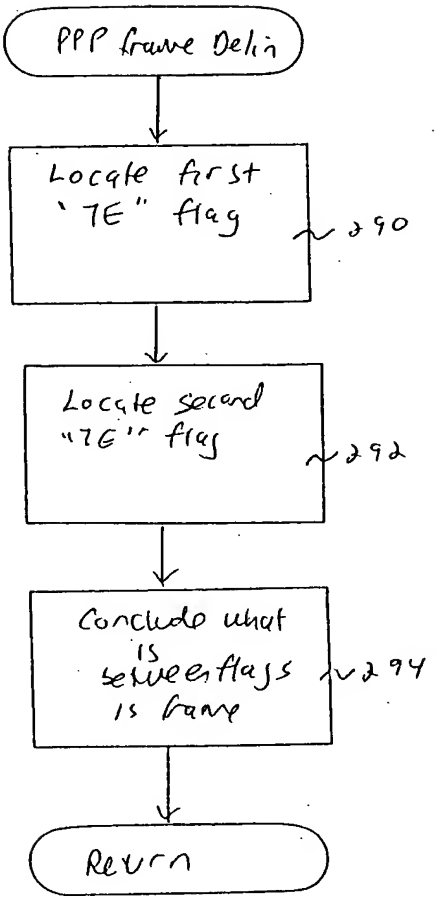

PPP frame Delin
Locate first "7E" flag
290
Locate second "7E" flag
292
Conclude what is between flags is frame
294
Return

Figure 18

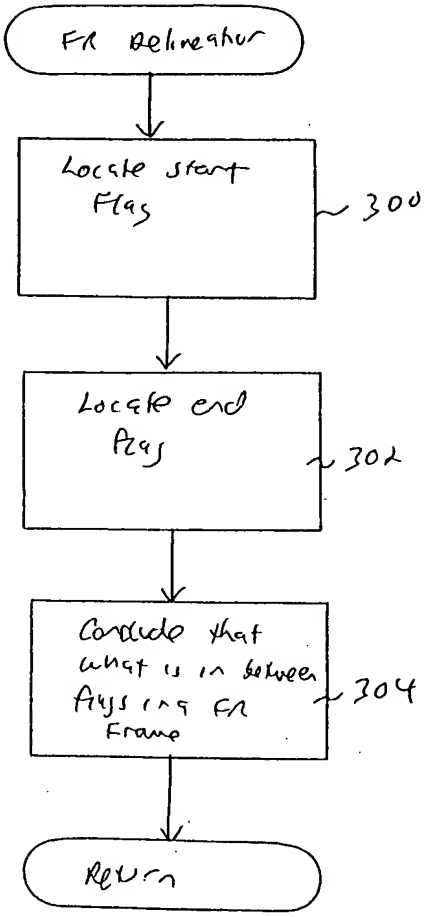

FR Delineator
Locate start Flgs
300
Locate end flgs
302
Conclude that what is in between flgs are FR Frame
304
Return

Figure 19

312 — SONET [AAL5 [IP]]

314 — SONET [AAL5 [SNAP [IP]]]

316 — SONET [PPP [IP]]

318 — SONET [FR [IP]]]

320 — SONET [FR [SNAP [IP]]]

322 — SONET [FR [PPP [IP]]]

324 — SONET [AAL5 [PPP [IP]]]

328 — SONET [AAL5 [PPP [LLC [IP]]]]

332 — SONET [AAL5 [FR [IP]]]

334 — SONET [PPP [MPLS [IP]]]

336 — SONET [FR [MPLS [IP]]]

338 — SONET [AAL5 [MPLS [IP]]]

Figure 20

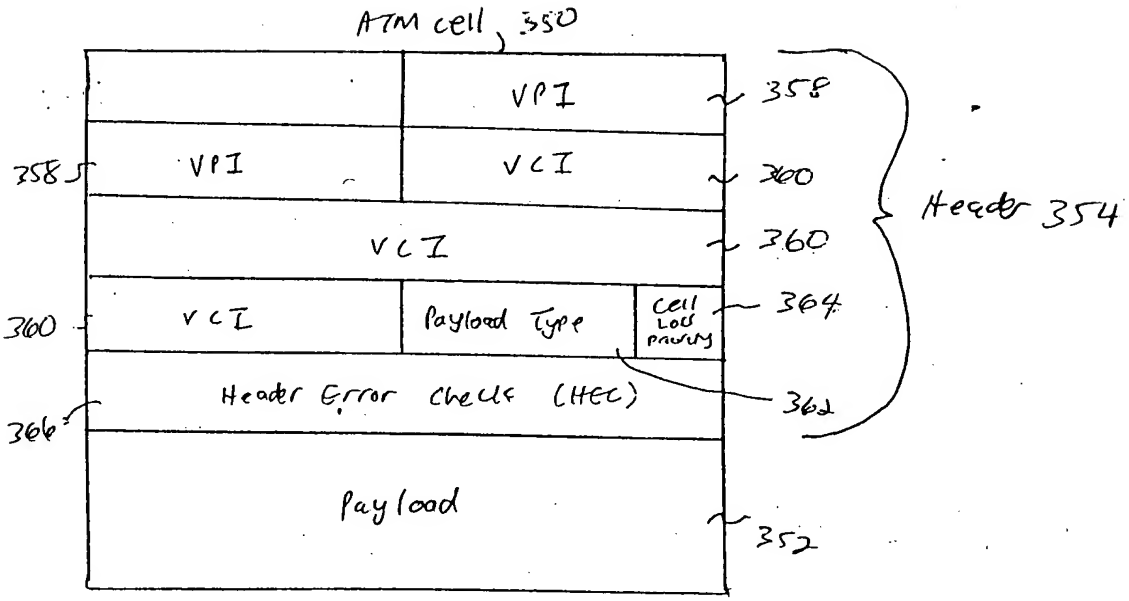

ATM cell 350
VPI
VPI
VCI
VCI
VCI
Payload Type
Cell Loss Priority
Header Error Check (HEC)
Payload
358
360
360
364
362
366
352
Header 354

Figure 21

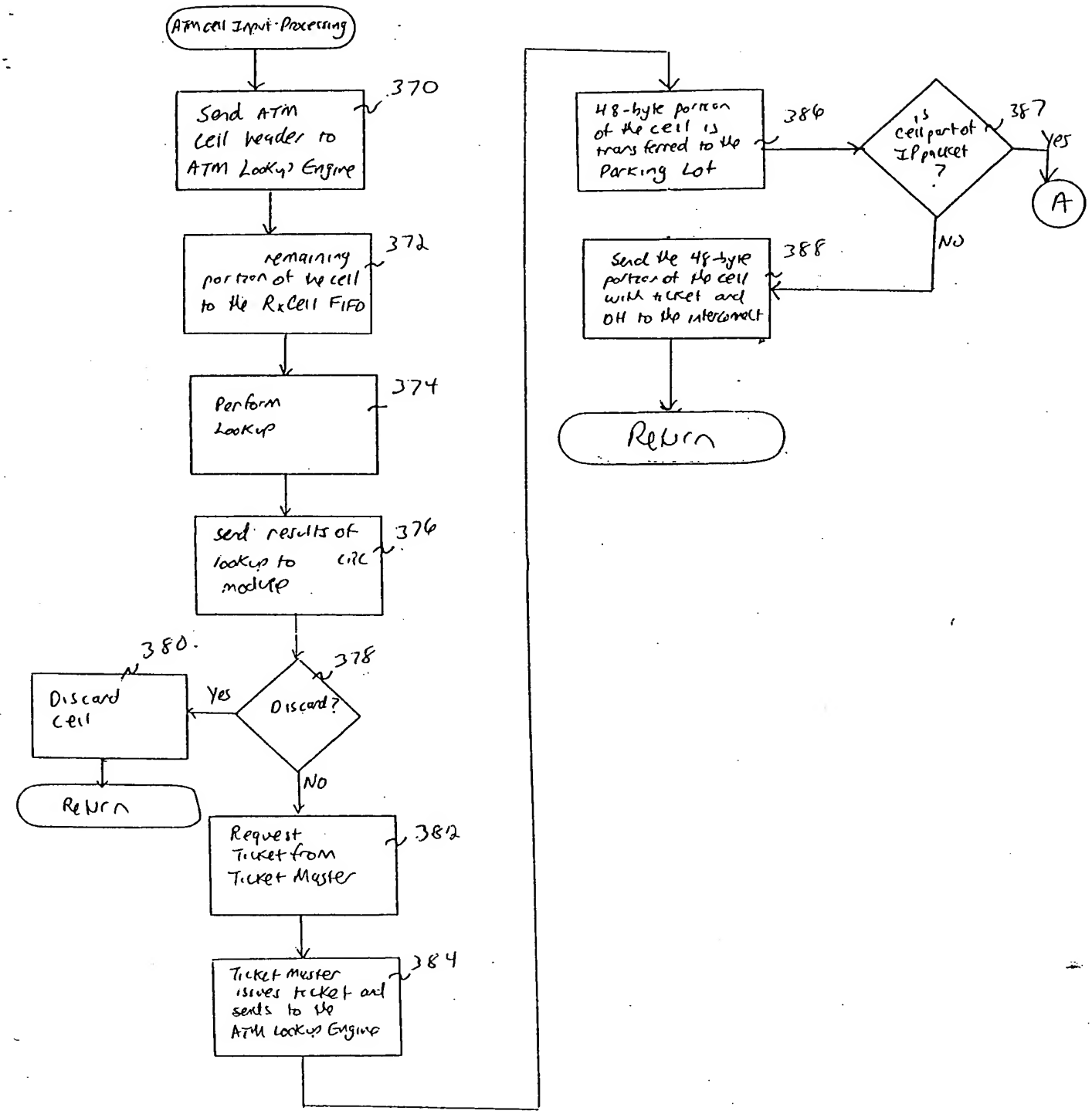

ATM cell Input Processing
Send ATM cell header to ATM Lookup Engine
370
remaining portion of the cell to the RxCell FIFO
372
Perform Lookup
374
send results of lookup to mod/cpp
376
CIRC
Discard?
378
Yes
Discard cell
380
No
Return
Request Ticket from Ticket Master
382
Ticket Master issues ticket and sends to the ATM Lookup Engine
384
48-byte portion of the cell is transferred to the Parking Lot
386
Is cell part of IP packet ?
387
Yes
A
No
Send the 48-byte portion of the cell with ticket and OH to the interconnect
388
Return

Figure 22

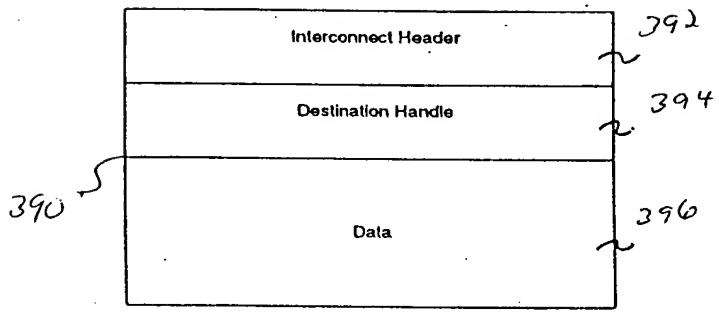

Interconnect Header
Destination Handle
Data
392
394
396
390

Figure 23

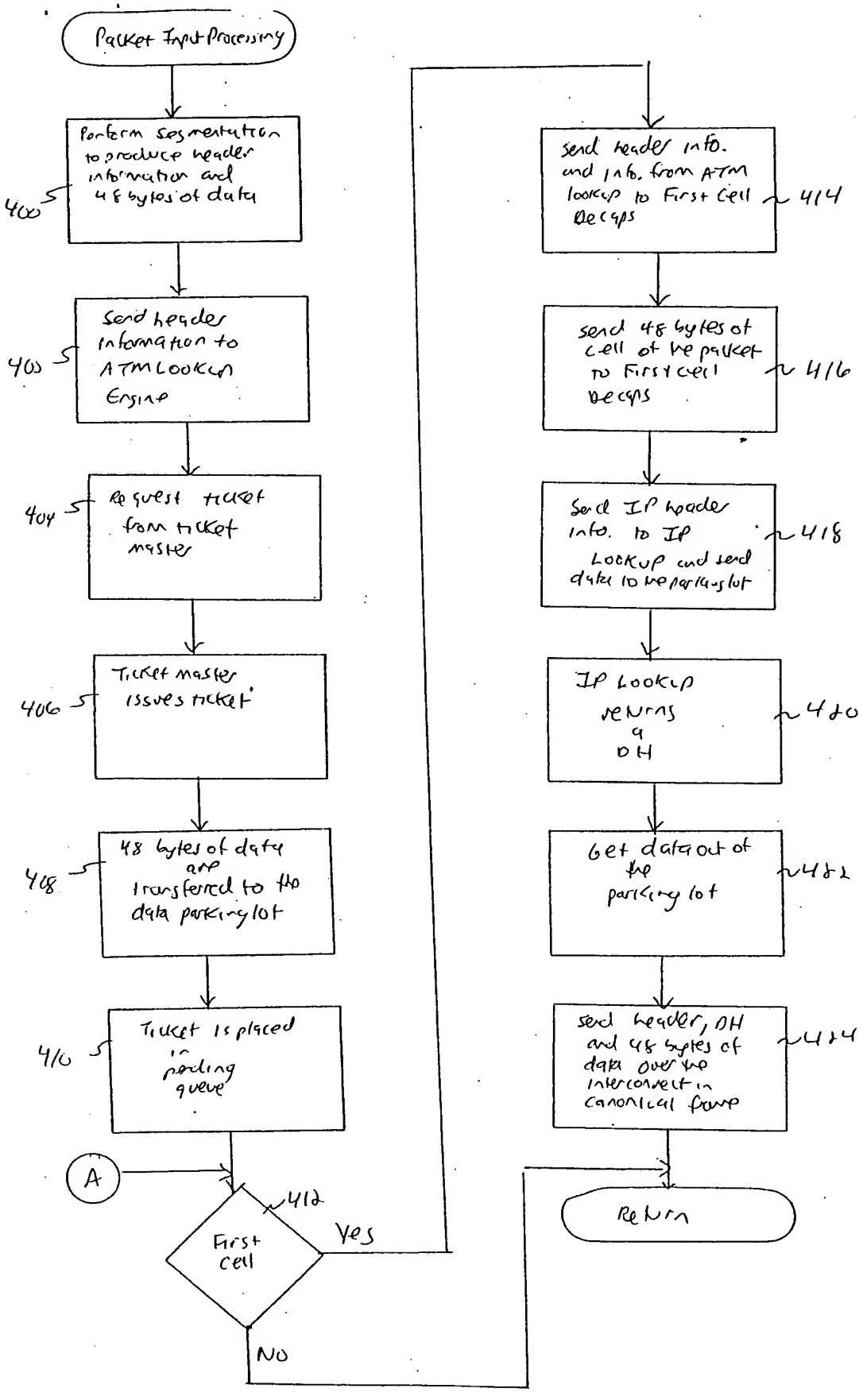

Packet Input Processing
Perform segmentation to produce header information and 48 bytes of data
400
Send header information to ATM Lookup Engine
402
Request ticket from ticket master
404
Ticket master issues ticket
406
48 bytes of data are transferred to the data parking lot
408
Ticket is placed in parking queue
410
A
First cell
412
Yes
No
Send header info. and info. from ATM lookup to First Cell Decaps
414
Send 48 bytes of cell of the packet to First cell Decaps
416
Send IP header info. to IP Lookup and send data to the parking lot
418
IP Lookup returns a DH
420
Get data out of the parking lot
422
Send header, DH and 48 bytes of data over the interconnect in canonical form
424
Return

Figure 4

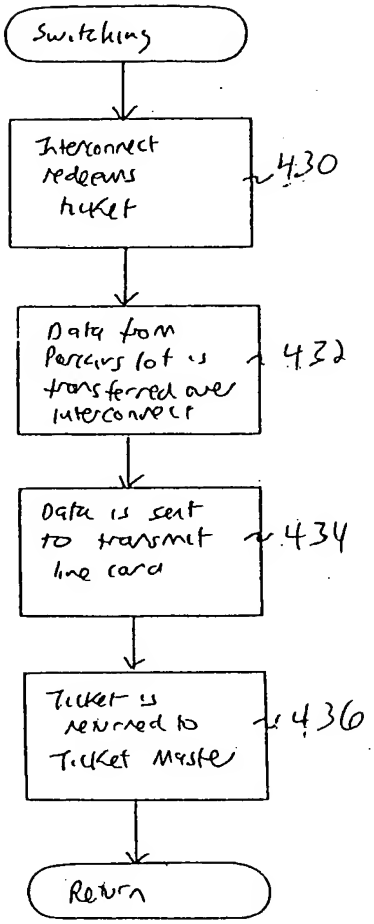

Switching
Interconnect redeems ticket
430
Data from Parsers lot is transferred over interconnect
432
Data is sent to transmit line card
434
Ticket is returned to Ticket Master
436
Return

Figure 25

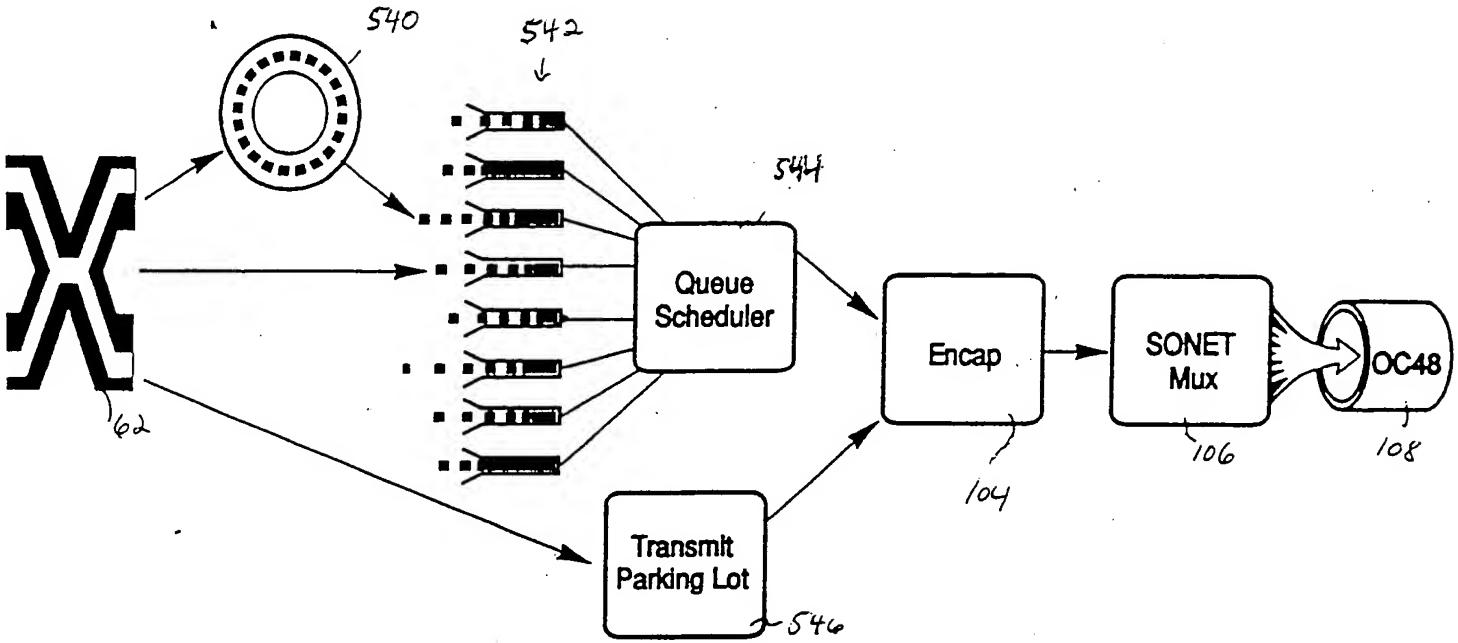
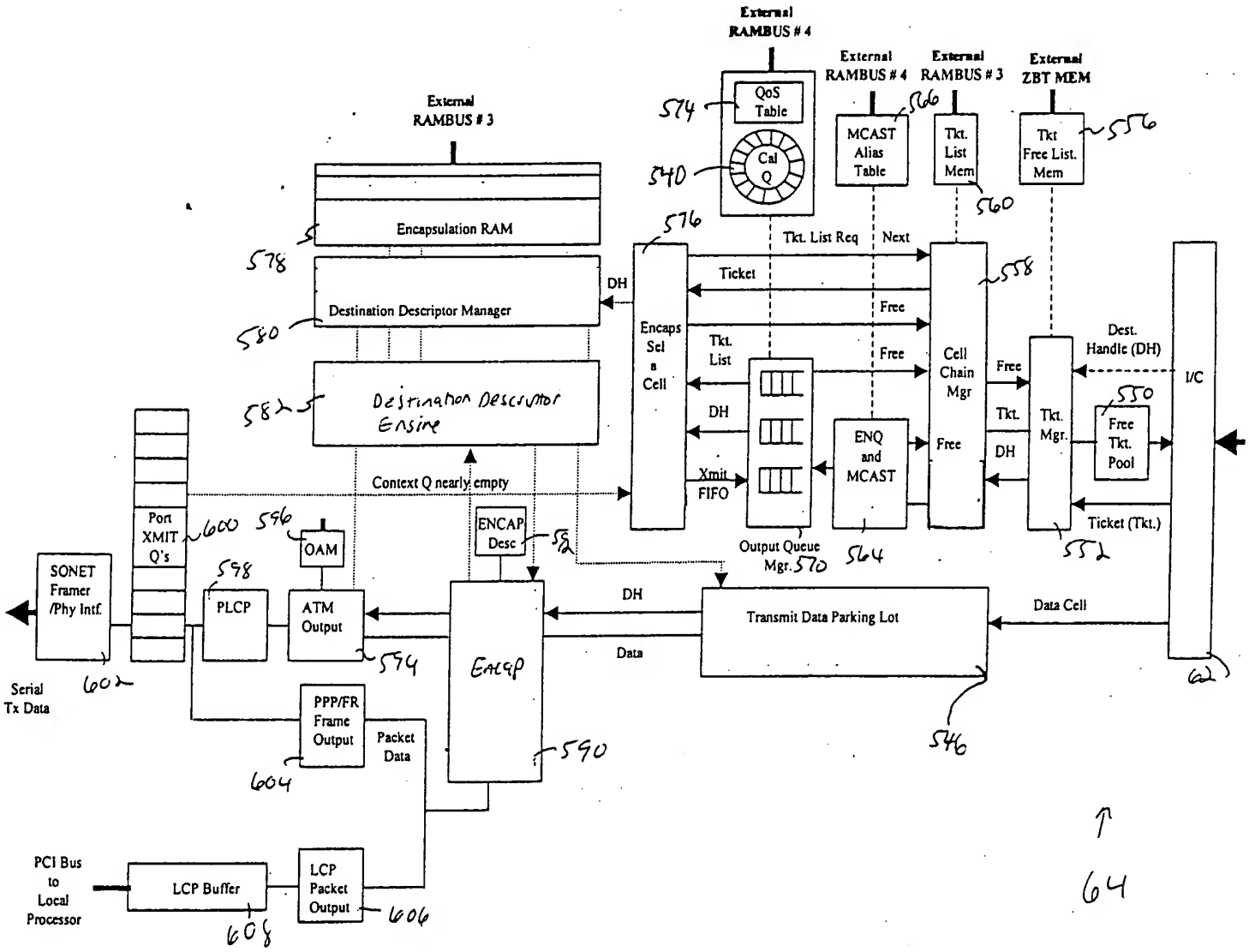

540
542
544
Queue Scheduler
Encap
SONET Mux
OC48
62
104
106
108
Transmit Parking Lot
546

Figure 26


External RAMBUS # 4
External RAMBUS # 4
External RAMBUS # 3
External ZBT MEM
External RAMBUS # 3
574
QoS Table
540
Cal Q
MCAST Alias Table
566
Tkt. List Mem
560
Tkt Free List. Mem
556
576
Encapsulation RAM
578
Destination Descriptor Manager
580
Destination Descriptor Engine
582
DH
Tkt. List Req
Next
Ticket
Free
Tkt. List
DH
Xmit FIFO
Encaps Sel a Cell
Output Queue Mgr. 570
ENQ and MCAST
564
Cell Chain Mgr
558
Free
Tkt.
DH
Free
Tkt. Mgr.
552
Dest. Handle (DH)
I/C
550
Free Tkt. Pool
Ticket (Tkt.)
Context Q nearly empty
Port XMIT Q's
600
596
OAM
ENCAP Desc
592
598
PLCP
ATM Output
594
SONET Framer /Phy Intf.
602
Serial Tx Data
DH
Data
Encap
590
Transmit Data Parking Lot
Data Cell
546
62
PPP/FR Frame Output
604
Packet Data
PCI Bus to Local Processor
LCP Buffer
608
LCP Packet Output
606

64

Figure 7